



Model 685A09

Linear adjust mechanical switch, 0 to 7 g's, 0 to 100 Hz, pushbutton reset

Installation and Operating Manual

**For assistance with the operation of this product,
contact the PCB Piezotronics, Inc.**

Toll-free: 800-959-4464

24-hour SensorLine: 716-684-0001

Fax: 716-684-3823

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Web: www.imi-sensors.com



Repair and Maintenance

PCB guarantees Total Customer Satisfaction through its “Lifetime Warranty Plus” on all Platinum Stock Products sold by PCB and through its limited warranties on all other PCB Stock, Standard and Special products. Due to the sophisticated nature of our sensors and associated instrumentation, **field servicing and repair is not recommended and, if attempted, will void the factory warranty.**

Beyond routine calibration and battery replacements where applicable, our products require no user maintenance. Clean electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the material of construction. Observe caution when using liquids near devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth—never saturated or submerged.

In the event that equipment becomes damaged or ceases to operate, our Application Engineers are here to support your troubleshooting efforts 24 hours a day, 7 days a week. Call or email with model and serial number as well as a brief description of the problem.

Calibration

Routine calibration of sensors and associated instrumentation is necessary to maintain measurement accuracy. We recommend calibrating on an annual basis, after exposure to any extreme environmental influence, or prior to any critical test.

PCB Piezotronics is an ISO-9001 certified company whose calibration services are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to our standard calibration services, we also offer specialized tests, including: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For more information, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment

If factory repair is required, our representatives will provide you with a Return Material Authorization (RMA) number, which we use to reference any information you have already provided and expedite the repair process. This number should be clearly marked on the outside of all returned package(s) and on any packing list(s) accompanying the shipment.

Contact Information

PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY14043 USA
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General inquiries: info@pcb.com
Repair inquiries: rma@pcb.com

For a complete list of distributors, global offices and sales representatives, visit our website, www.pcb.com.

Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

Discontinue use and contact our 24-Hour Sensorline if:

- Assistance is needed to safely operate equipment
- Damage is visible or suspected
- Equipment fails or malfunctions

For complete equipment ratings, refer to the enclosed specification sheet for your product.

Definition of Terms and Symbols

The following symbols may be used in this manual:



DANGER

Indicates an immediate hazardous situation, which, if not avoided, may result in death or serious injury.

**CAUTION**

Refers to hazards that could damage the instrument.

**NOTE**

Indicates tips, recommendations and important information. The notes simplify processes and contain additional information on particular operating steps.

The following symbols may be found on the equipment described in this manual:



This symbol on the unit indicates that high voltage may be present. Use standard safety precautions to avoid personal contact with this voltage.



This symbol on the unit indicates that the user should refer to the operating instructions located in the manual.



This symbol indicates safety, earth ground.



PCB工业监视和测量设备 - 中国RoHS2公布表

PCB Industrial Monitoring and Measuring Equipment - China RoHS 2 Disclosure Table

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
住房	0	0	0	0	0	0
PCB板	X	0	0	0	0	0
电气连接器	0	0	0	0	0	0
压电晶体	X	0	0	0	0	0
环氧	0	0	0	0	0	0
铁氟龙	0	0	0	0	0	0
电子	0	0	0	0	0	0
厚膜基板	0	0	X	0	0	0
电线	0	0	0	0	0	0
电缆	X	0	0	0	0	0
塑料	0	0	0	0	0	0
焊接	X	0	0	0	0	0
铜合金/黄铜	X	0	0	0	0	0
本表格依据 SJ/T 11364 的规定编制。						
0：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。						
X：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。						
铅是欧洲RoHS指令2011/65/ EU附件三和附件四目前由于允许的豁免。						

CHINA RoHS COMPLIANCE

Component Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Chromium VI Compounds (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	O	O	O	O	O	O
PCB Board	X	O	O	O	O	O
Electrical Connectors	O	O	O	O	O	O
Piezoelectric Crystals	X	O	O	O	O	O
Epoxy	O	O	O	O	O	O
Teflon	O	O	O	O	O	O
Electronics	O	O	O	O	O	O
Thick Film Substrate	O	O	X	O	O	O
Wires	O	O	O	O	O	O
Cables	X	O	O	O	O	O
Plastic	O	O	O	O	O	O
Solder	X	O	O	O	O	O
Copper Alloy/Brass	X	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572.

Lead is present due to allowed exemption in Annex III or Annex IV of the European RoHS Directive 2011/65/EU.



Model 685A09/685A19/29/39 Mechanical Vibration Switch



SENSORS AND INSTRUMENTATION FOR MACHINE CONDITION MONITORING

Operating Guide

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Introduction

The Mechanical Vibration Switch is a shock sensitive mechanism for shutdown of engine or electric motor powered equipment. This switch uses a patent pending linear adjustment magnetic latch technology to ensure reliable operation. Pushing the reset button moves the tripping latch into a magnetically held position. A shock/vibration will move the magnet beyond this holding position, thus freeing the spring loaded tripping latch to transfer the contacts and shut down the machinery.

General Features

- Designed to Detect Shock/Vibration in 3 Planes of Motion
- Fully Adjustable, with patent pending linear adjustment technology
- Includes Magnetic Latching Feature
- Accommodates normally open (NO) and normally closed (NC) wiring schemes
- Manual Reset Button
- IP66 rated enclosure
- Remote Reset
 - 685A19: 24VDC Remote Reset
 - 685A29: 120VAC Remote Reset
 - 685A39: 240VAC Remote Reset
- Top cover is secured with socket head cap screws for easy access to wiring terminals



WARNING



AC and DC input signals and power supply voltages could be hazardous.

- **DO NOT connect live wires to screw terminal plugs**
- **DO NOT insert, remove, or handle screw terminal plugs with live wires connected**
- **DO NOT make any adjustments to the setpoint with live wires present**
- **DO NOT open the unit if machine is powered or running**
- **DO NOT open the unit if the Relays are energized**
- **DO NOT open the unit if the Reset Coil is energized**
- **DO NOT make any adjustments if machine is energized and/or power is present anywhere in the switch.**

BEFORE BEGINNING INSTALLATION OF THIS IMI PRODUCT:

- ✓ Stop the machine.
- ✓ Disconnect all electrical power to the machine.
- ✓ Make sure the machine cannot operate during installation by following proper lock out tag out procedures.
- ✓ Follow all safety warnings of the machine manufacturer.
- ✓ Read and follow all installation instructions.

Installation:

ELECTRICAL


WARNING: REMOVE POWER BEFORE OPENING THE UNIT (ACCESS DOOR). STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING THE WIRING OPERATION. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON INSTALL AND WIRE THE UNIT, AND MAKE SURE IT CONFORMS WITH NEC AND APPLICABLE CODES.

The vibration switch is sensitive to shock and vibration in all three planes of motion – up/down, front/back and side/side. Side/side (in the same plane as the reset pushbutton) is the most sensitive. For maximum sensitivity, mount the unit so that the side with the reset button is in-line with the direction of rotation of the machine.

The vibration switch must be firmly attached/mounted to the machine so that all mounting surfaces are in rigid contact with the mounting surface of the machine. For best results, mount the instrument in-line with the direction of rotating shafts and/or near bearings. In other words, the reset push button should be mounted pointing into the direction of shaft rotation. It may be necessary to provide a mounting plate or bracket to attach the 685Ax9 to the machine. The mounting bracket should be thick enough to prevent induced acceleration/vibration upon the 685x9. Typically 1/2 in. (13mm) thick plate is sufficient.

CAUTION: A dust boot is provided on the reset pushbutton for all series to prevent moisture or dust intrusion. The sensitivity adjustment has an o-ring compression seal; if possible, the mounting orientation should be on a horizontal plane or with the sensitivity adjustment pointing down if possible.

- 1) Firmly secure the unit to the equipment using the base foot mount.
- 2) Make the necessary electrical connections to the vibration switch. See Internal Switches in the next section for electrical terminal locations and for typical wiring. **DO NOT EXCEED VOLTAGE OR CURRENT RATINGS OF THE CONTACTS.** Follow appropriate electrical codes/methods when making electrical connections. Be sure that the run of electrical cable is secured to the machine and is well insulated from electrical shorting. Use of conduit is recommended.

NOTE: If the electrical cable crosses a pivot point such as at the pivot of the walking beam, be sure to allow enough slack in the cable so that no stress is placed on the cable when the beam moves.

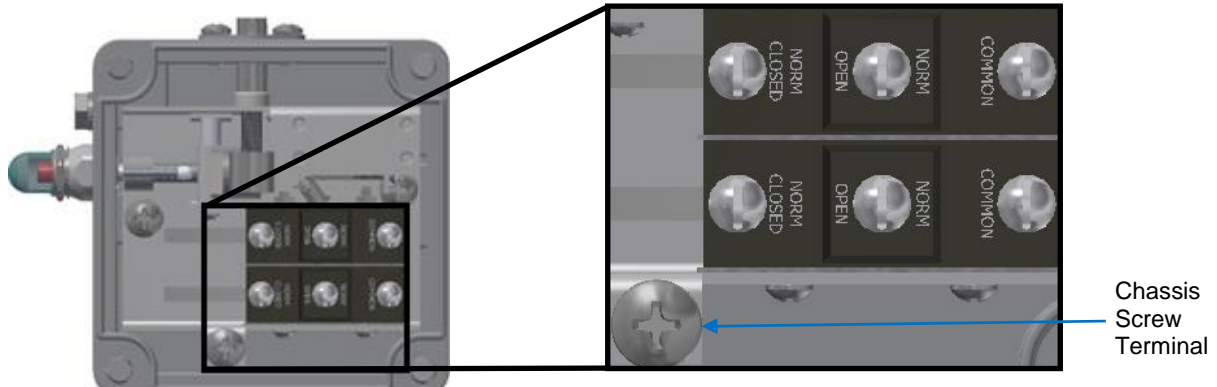
If conduit is not used for the entire length of wiring, conduit should be used from the electrical supply box to a height above ground level that prevents damage to the exposed cable from the elements, rodents, etc. or as otherwise required by applicable electrical codes. If conduit is not attached directly to the switch, use a strain relief bushing and a weatherproof cap on the exposed end of the conduit. A “drip loop” should be provided in the cable to prevent moisture from draining down the cable into the conduit should the weatherproof cap fail.

Internal Switches

The vibration switch uses 2 SPDT switch terminals with removable screws for all connections (see below). Wire the relays depending on application, either Normally Open or Normally Closed. The Normally Open and Normally Closed are referenced to the Common screw terminal connector.

WARNING: Do not exceed the maximum relay ratings as noted below.

Rated Voltage	Resistive Load	Inductive Load	Motor, Lamp Load	
			N.C	N.O
AC 125V	15A	10A	4A	2A
AC 250V	15A	10A	3A	1.5A
AC 480V	3A	2A	-	-
DC 8V	15A	15A	-	-
DC 14V	15A	10A	-	-
DC 30V	6A	5A	-	-
DC 125V	0.5A	0.05A	-	-
DC 250V	0.25A	0.03A	-	-

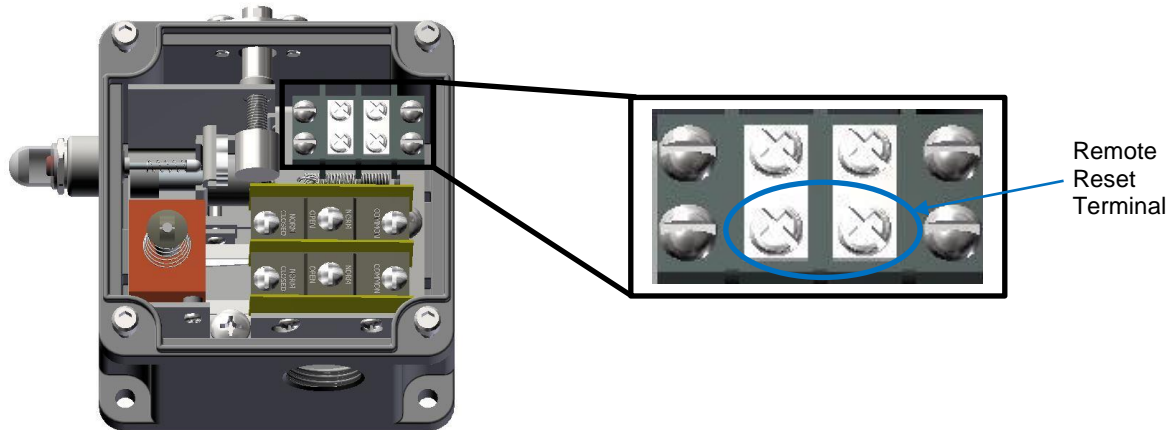


Remote Reset and Power On Delay

Models 685A19, 685A29 and 685A39 have provisions to reset the switch remotely. The vibration switch can be remotely reset after being tripped by applying the correct voltage across the reset terminal as shown below.

NOTE: There is no positive/negative polarity needed for the wiring.

NOTE: While the power is applied to the remote reset terminals, the switch cannot be tripped.



Power On Delay:

685A19 Only – A 24VDC power supply is needed to remotely reset the switch by energizing a solenoid. The 24VDC power source must be capable of supplying at least 2A of current. Upon power up, the unit will need the 2A to energize the remote reset coil. Depending on ambient temperature, this will decrease to approximately 0.4A after 5-10 seconds. After that time, the coil can be energized indefinitely.

To protect the remote reset solenoid from overheating, the unit has a built in thermistor that will limit the coil current after a certain amount of time. This time is dependent on ambient temperature and if the reset coil was recently energized. Since the coil needs the peak current only for a short period of time, the thermistor lowers the current but it is still strong enough to hold the switch in reset mode. **Please note that the switch will start feeling warm to the touch if the remote reset coil is left energized for more than a few minutes.**

685A29 Only – A 120VAC power supply is needed to remotely reset the switch by energizing a solenoid. Upon applying 120VAC to the solenoid, the unit will need 184mA to energize the remote reset coil. At standard ambient temperature, the solenoid has a 25% “on” 75% “off” cycle.

Maximum allowed On Time (remote reset energized) versus minimum Off Time (remote reset de-energized)

On Time (25%)	Off Time (75%)	Total Time (100%)
4 Minutes (Max)	12 Minutes	16 Minutes
2 Minutes	6 Minutes	8 Minutes
1 Minute	3 Minutes	4 Minutes
30 seconds	1.5 Minutes	2 Minutes

NOTE: If using the solenoid for a power on delay, do not exceed the “on” times listed. If the “on” time exceeds 4 minutes and/or the “off” time is shortened before energizing the solenoid again, the solenoid will be permanently damaged.

685A39 Only – A 240VAC power supply is needed to remotely reset the switch by energizing a solenoid. Upon applying 240VAC to the solenoid, the unit will need 92mA to energize the remote reset coil. At standard ambient temperature, the solenoid has a 25% “on” 75% “off” cycle.

Maximum allowed On Time (remote reset energized) versus minimum Off Time (remote reset de-energized)

On Time	Off Time	Total Time (100%)
4 Minutes (Max)	12 Minutes	16 Minutes
2 Minutes	6 Minutes	8 Minutes
1 Minute	3 Minutes	4 Minutes
30 seconds	1.5 Minutes	2 Minutes

NOTE: If using the solenoid for a power on delay, do not exceed the “on” times listed. If the “on” time exceeds 4 minutes and/or the “off” time is shortened before energizing the solenoid again, the solenoid will be permanently damaged.

Setting Up The Switch

The 685AX9 covers a wide range of sensitivity and needs to be adjusted specifically for the machine on which it is installed. After the switch has been installed in a satisfactory location (see last section of manual for some typical mounting locations), the sensitivity adjustment will need to be increased or decreased so that the switch does not trip during start-up or under normal operating conditions.

NOTE: If using a remote reset model (eg: 685A19/685A29/685A39), the minimum sensitivity setting for the remote reset to work properly is 1 turn clockwise. That is, with no motion, if turning the Sensitivity adjustment screw counterclockwise until the magnet disengages, for the remote reset to work properly, the minimum setting is 1 turn clockwise from that location.

This is typically done as follows:

- 1) **REPLACE ALL COVERS, LIDS, AND ELECTRICAL ENCLOSURES.**
- 2) Press the reset push button (see **Figure 1, Figure 1A**) to engage the magnetic latch. Be sure that the reset button remains depressed. If it does not remain depressed, turn sensitivity adjustment screw (see **Figure 2, Figure 2A**) clockwise until it does. A large screwdriver is needed to turn the Sensitivity Adjustment Screw. Do not try to turn the Sensitivity Adjustment Screw with your fingers as this could lead to injury.



Figure 1: Reset Button



Figure 2: Sensitivity Adjustment Screw

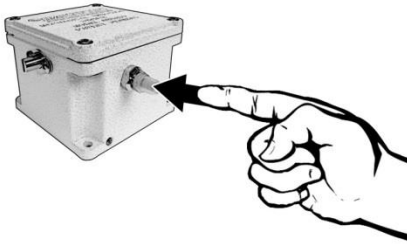


Figure 2A: Resetting the Switch

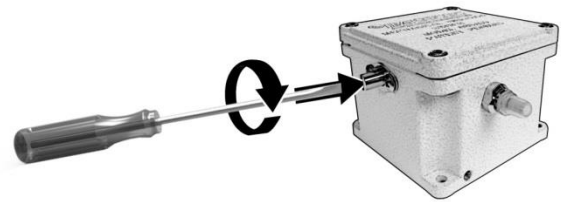
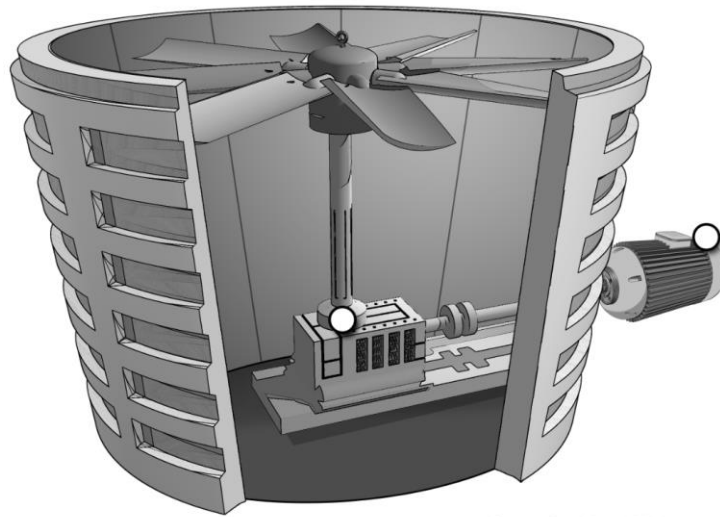


Figure 2A: Adjusting the Sensitivity

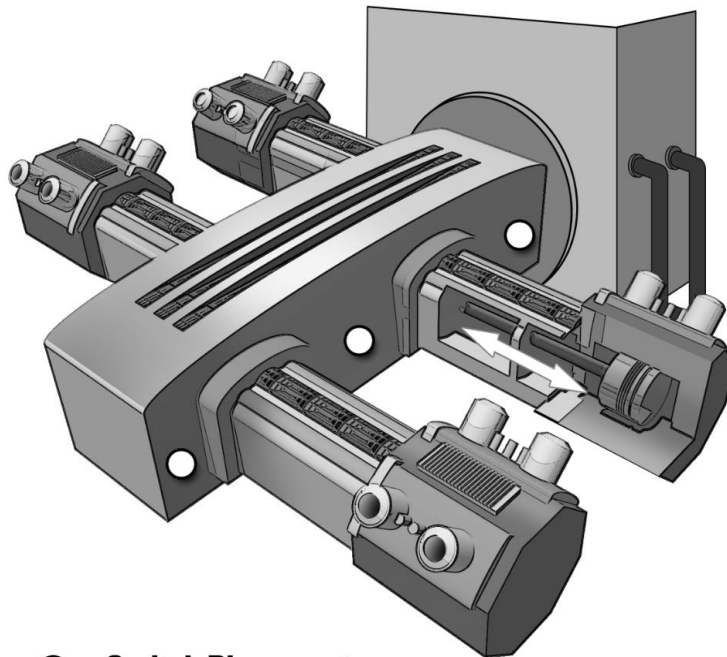
- 3) Start the machine.
- 4) If the instrument trips on start-up, allow the machine to stop. Turn the sensitivity adjustment $\frac{1}{4}$ to $\frac{1}{2}$ turn clockwise. Depress the reset button and restart the machine. Repeat this process until the unit does not trip on start-up.
- 5) If the instrument does NOT trip on start-up, stop the machine. Turn the sensitivity adjustment screw $\frac{1}{4}$ to $\frac{1}{2}$ turn counter-clockwise. Repeat the start-up/stop process until the instrument trips on start-up. Turn the sensitivity adjustment screw $\frac{1}{4}$ to $\frac{1}{2}$ turn clockwise (less sensitive). Restart the machine to verify that the instrument will not trip on start-up.
- 6) Verify that the unit will trip when abnormal shock/vibration exists.

Typical Installation Locations



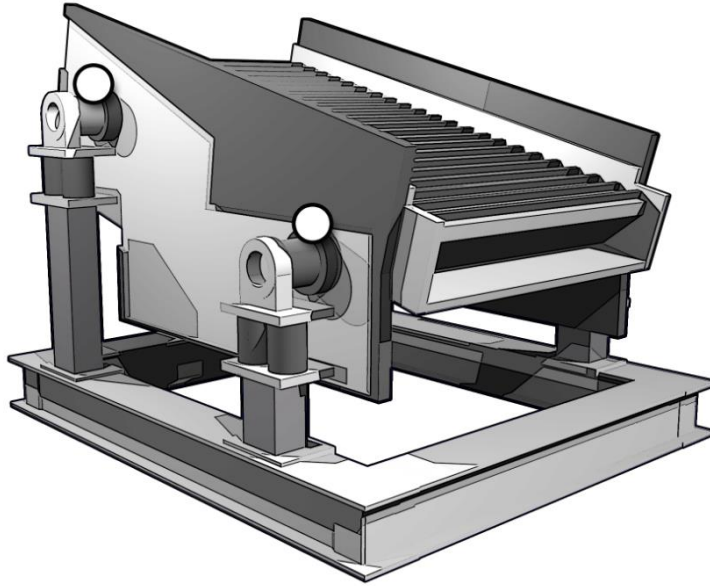
○ = Switch Placement

Cooling Tower Fan and Motor



○ = Switch Placement

Reciprocating Compressor



○ = Switch Placement

Vibratory Screens

	ENGLISH	SI
Performance		
Measurement Range	7 g pk	68.7 m/s ² pk
Frequency Range	0 to 6,000 cpm	0 to 100 Hz
Relay	3A Form C 480 VAC	3A Form C 480 VAC
Relay(Contacts)(DPDT)	Normally Open / Closed	Normally Open / Closed
Control Interface		
Reset Function	Momentary Pushbutton Switch	Momentary Pushbutton Switch
Environmental		
Temperature Range(Operating)	-40 to 140 °F	-40 to 60 °C
Enclosure Rating	IP66	IP66
Physical		
Size (Width x Height x Depth)	4.35 in x 3.30 in x 4.35 in	110.5 mm x 83.8 mm x 110.5 mm
Weight	2.5 lb	1,132 gm
Sensing Element	Magnet	Magnet
Housing Material	Aluminum Alloy	Aluminum Alloy
Electrical Connector	Screw Terminals	Screw Terminals
Screw Terminal Wire Size	24-14 AWG	0.2 - 2.5 mm ²
Cable Input	3/4-14 NPT	3/4-14 NPT
Mounting Hole Size	0.25 in	6.4 mm
Sensing Geometry	Inertial Element	Inertial Element

OPTIONAL VERSIONS

Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.

NOTES:

Entered: LK	Engineer: NJF	Sales: MC	Approved: NJF	Spec Number:
Date: 08/17/2020	Date: 08/17/2020	Date: 08/17/2020	Date: 08/17/2020	50857

All specifications are at room temperature unless otherwise specified.
 In the interest of constant product improvement, we reserve the right to change specifications without notice.

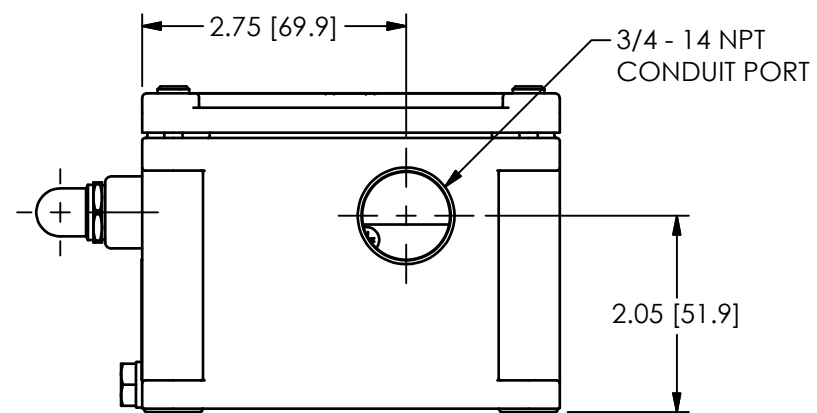
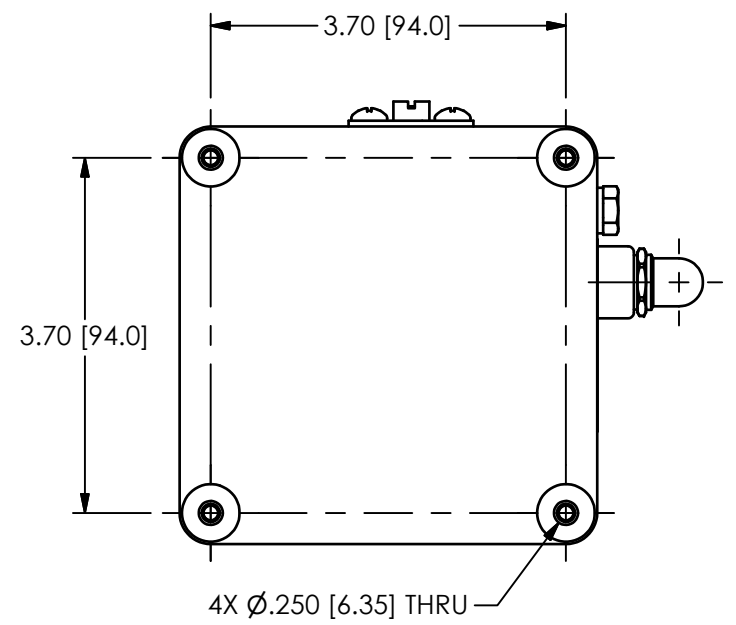
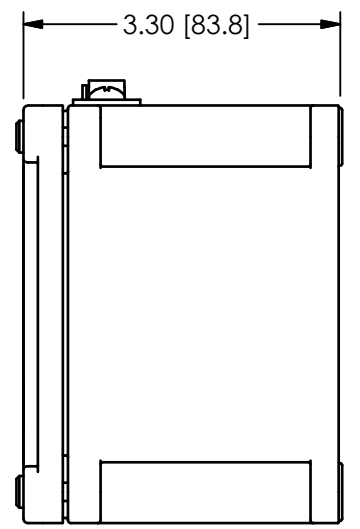
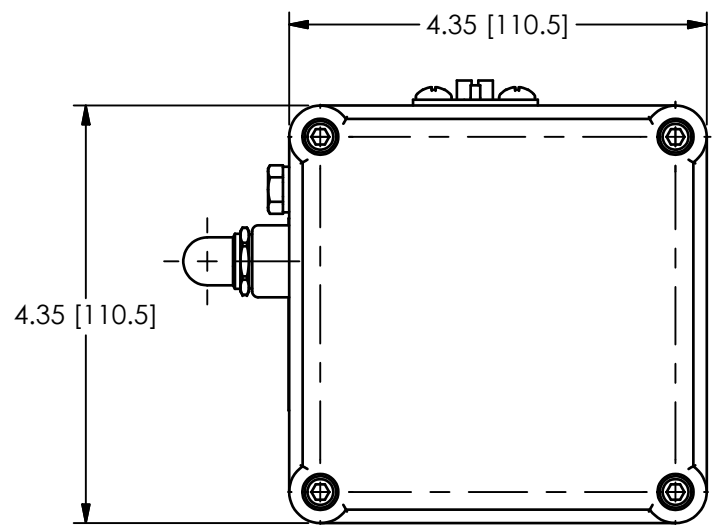
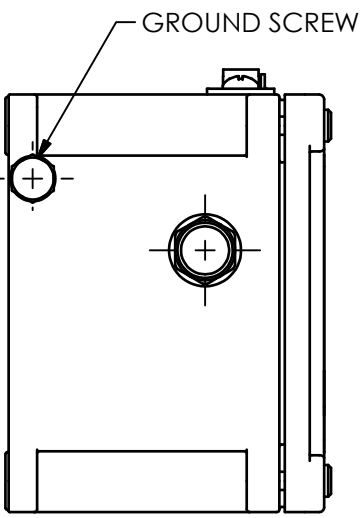
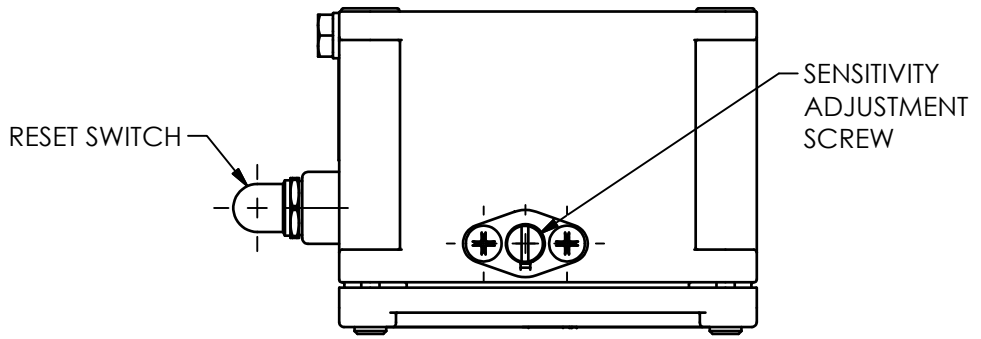
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REVISIONS		
REV	DESCRIPTION	DIN
C	ADDED NOTE 1	46319



1.) THREADED PLUG NOT SHOWN

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:		DRAWN		CHECKED		ENGINEER		PCB PIEZOTRONICS™		
DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS [IN BRACKETS]	KRM	1/4/17	JDM	1/4/17	JDB	1/4/17	3425 WALDEN AVE. DEPEW, NY 14043 (716) 684-0001 E-MAIL: sales@pcb.com		
DECIMALS XX ±.03 XXX ±.010	DECIMALS X ±0.8 XX ±0.25	TITLE OUTLINE DRAWING MECHANICAL VIBRATION SWITCH 685A09, A19, A29, A39						CODE IDENT. NO. 52681	DWG. NO. 56470	SCALE: .5X SHEET 1 OF 1
ANGLES ± 2 DEGREES	ANGLES ± 2 DEGREES									
FILLETS AND RADII .003 - .005	FILLETS AND RADII 0.07 - 0.13									